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EXAMINER
TRAN, NHAN T

ART UNIT	PAPER NUMBER
2615	12

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/298,306	Applicant(s) FOSSUM ET AL.	
	Examiner Nhan T. Tran	Art Unit 2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 June 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16 and 18-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-16 and 18-21* is/are rejected.

7)☒ Claim(s) *12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 6/13/2003 have been fully considered but they are not persuasive.

With respect to the amended claims 1, 14 & 16, on pages 7 & 8, the Applicant asserts that Lu does not disclose an analog to digital converter which produces a digital output indicative of an output of each pixel of the image sensor and represents digital values of the pixels.

In response, the Examiner respectfully disagrees and submits that Lu clearly shows the digital exposure controller 9 (Fig. 2; col. 6, lines 29-35) and further in details, Lu shows the logical OR gates 15a & 15b (Fig. 3; col. 6, lines 60-67) which fundamentally receive only digital signals to perform logical OR function. Therefore, an A/D converter is inherently incorporated either in the digital exposure controller 9 or somewhere prior to the inputs of the OR gates. Furthermore, the digital output of the inherent A/D converter as analyzed above indicates the intensity levels of color components of each pixel of the image sensor in digital values (see col. 6, lines 29-35).

In the third paragraph of page 8, the Applicant further asserts that Lu does not teach or suggest threshold detectors which compare counting results of the first and second counters with desired thresholds.

In response, the Examiner respectfully disagrees. Lu discloses, in col. 4, lines 21 - 29, that the count N(1) and N(2) are compared to the threshold of 1% wherein if N(1)>1% of the

total number of pixels in the image sensor, the image is over-exposed, and if N(2)<1% the image is under-exposed.

On page 9, the Applicant further asserts that the Baumeister is not properly combinable with the teaching of Lu since Lu only uses single bit determination in its exposure-correcting system and Lu does not suggest to review only certain most significant bits of the digital outputs.

In response, the Examiner respectfully disagrees with the Applicant. Lu discloses, "the outputs from the two OR gates are supplied to an exposure judgment controller 16 which maintains a count N(1) of pixels...a count of N(2) of pixels..." (col. 7, lines 2-9 & Fig. 3). The two outputs from OR gates 15a and 15b represent at least two bits of digital values, not a single bit, in determination of exposure levels of pixels and performing exposure adjustment in Lu. In the Baumeister's reference, Baumeister provides a teaching of using most significant bits of the digital outputs of pixels from an A/D converter in calculation for exposure control (see Baumeister, col. 2, lines 4-12, lines 18-28 & lines 54-57). Both Lu and Baumeister teach digital exposure control for a camera utilizing plurality of digital values of pixels of an image sensor. Therefore, Baumeister is properly combinable with Lu.

In view of the above, the Examiner believes that the broadest interpretation of the present claimed invention does, in fact, read on the cited references at least for the reasons discussed above and as stated in the following Office Action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 & 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Lu et al (US 5,504,524).

Regarding claim 1, Lu discloses an automatic exposure adjusting device, comprising:

an image sensor (3) having a plurality of pixels and further having an adjustment capability (e.g., varies integration time to adjust exposure) (see col. 4, lines 25-29);

an inherent analog to digital converter which produces a digital output indicative of an output of each pixel of the image sensor (see Fig. 2 & 3; col. 6, lines 29-35 & lines 60-67 wherein an A/D converter must exist prior to the inputs of the logical OR gates 15a & 15b or within the digital exposure controller 9);

a first counter (indicated by N(1)) which counts a number of overexposed parts (pixels) of the digital output (see fig. 3; col. 4, lines 16-18);

a second counter (indicated by N(2)) which (indirectly) counts a number of underexposed parts (pixels) of the digital output by counting well exposed pixels for use in calculation of underexposed pixels (see fig. 3; col. 4, lines 18-28);

a plurality of threshold detectors which compares counting results of the first and second counters with desired thresholds (greater than 1% region, or less than 1% region) (see figs. 3 & 4; col. 4, lines 16-29; col. 7, lines 2-9);

a decision element (exposure calculator 17), which makes a decision to either increase an exposure of the image sensor or decrease an exposure of the image sensor based on a relation with the thresholds (see col. 7, lines 10-19).

Regarding claim 13, Lu also teaches that the exposure is one of a shutter width (e.g., variation of the sensor cell integration time) or a gain of the image sensor as clearly shown in col. 4, lines 35-40; col. 6, lines 29-35.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al (US 5,504,524).

Regarding claim 11, Lu does not explicitly disclose that the image sensor includes an active pixel sensor with a plurality of pixels of CMOS image sensor, each pixel including an in-pixel buffer transistor and in-pixel selection transistor. However, an Official Notice is taken for

such active image sensor, which is well known in the art for use in imaging devices as an advanced CMOS image sensor that integrates necessary features in a self-contained pixel for electronic shuttering, anti-blooming purposes as well as reducing circuit size.

Therefore, it would have been obvious to those skilled in the art to use the active image sensor as an advanced CMOS sensor for electronic shuttering, anti-blooming purposes as well as reducing circuit size.

4. Claims 2-9, 14-16 & 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al (US 5,504,524) in view of Baumeister (US 4,684,995).

Regarding claims 14, Lu discloses automatic exposure adjusting image sensor device, comprising:

an image sensor (3), including a plurality of adjustable photodetectors (e.g., varies integration time), each photoreceptor defining a pixel of the image, and the image sensor having an adjustable exposure which when increased, increases an amount of exposure, and when decreased, decreases an amount of exposure (see figs. 2-4; col. 4, lines 21-29; col. 6, lines 29-34 & col. 7, lines 10-19);

an inherent analog to digital converter which obtains an analog output from the image sensor and produces a digital output indicative of the analog output to thereby produce a plurality of digital outputs for the plurality of pixels (see fig. 2, col. 6, lines 29-35 & lines 60-67 and the analysis in claim 1 for the digital values of the pixels);

a pixel characterization element (combining means 14) characterizing the pixel according to its exposure characteristics (see figs. 3 & 4; col. 6, line 48 – col. 7, line 9);

a counter element (N(1) & N(2) located inside exposure judgment controller 16), which counts numbers of pixels characterized by the pixel characterization element and compares the count with certain thresholds (see col. 7, lines 2-14);

an image adjusting element (exposure calculator 17), which adjusts the exposure based on the count (see col. 7, lines 10-19);

Although Lu does not explicitly teach that the pixel characterization element investigates only certain most significant bits of at least a plurality of the digital outputs, Baumeister clearly teaches that the most significant bits (MSB) are used in determination of exposure level of pixels since the MSB of the pixel information provide sufficient image information for exposure measurement as described in col. 2, lines 4-12, lines 18-20 & lines 54-57.

Therefore, it would have been obvious to one of ordinary skill in the art to modify Lu with Baumeister for digital exposure control in a camera utilizing the most significant bits (MSB) of the pixel information to provide sufficient image information for exposure measurement and correction.

Regarding claim 15, Lu inherently teaches a memory storing the thresholds in order for the camera system to function as disclosed.

Lu does not disclose that the memory is variable to change the threshold. However, it would have been well known in the art to use some kind of programmable memory, such as

EEPROM for storing threshold levels so that the user could change the threshold levels by re-programming the memory with new thresholds.

Therefore, it would have been obvious to those skilled in the art to make use of the programmable memory, such as EEPROM for storing threshold levels so that the user could change the threshold levels by re-programming the memory with new thresholds.

Regarding claim 16, the claimed limitations are met in the analysis with respect to claims 14 & 15. In addition, Baumeister teaches that only a number of most significant bits of pixels and not all bits of the pixels are investigated (see Baumeister; col. 2, lines 54-57).

Regarding claim 2, the claimed limitations are met in the analysis with respect to claim 14.

Regarding claims 3 & 18, Lu teaches the first counter counts a number of pixels that are overexposed representing "1" (high output) which exceeds V3 as described in figs. 3 & 4, col. 6, lines 63 – col. 7, line 19, and Baumeister teaches exposure measurement based upon the most significant bits of the pixel information as described in col. 2, lines 18-20 & 54-57.

Someone skilled in the art would motivate to combine the teaching of both Lu and Baumeister to end up with a solution for exposure measurement and control utilizing at least one of "1" (further limit "11") of the most significant bits detected as overexposed pixels since such information is sufficient enough for exposure measurement and control in an imaging device as suggested by Baumeister in col. 2, lines18-20 & 54-57.

Therefore, it would have been obvious to those skilled in the art to motivate to implement the representation of at least one of "1" (further limit "11") of the most significant bits as an overexposed pixel information for the digital exposure measurement and control in an imaging device.

Regarding claims 4 & 19, for the similar analysis as discussed in claim 3, it would have also been obvious to those skilled in the art to recognize the representation of "0" of the most significant bits as underexposed pixel information for the digital exposure control measurement and control in an imaging device.

Regarding claim 5, the claimed limitation is encompassed by claim 4, wherein at least one zero ("0") has been detected as an underexposed pixel information.

Regarding claim 6, Lu also discloses the threshold detector include values indicative of what percentage of the image have underexposed or overexposed pixels, the decision element increasing or decreasing the exposure based on percentages (see col. 7, lines 10-19).

Regarding claim 7, Lu further discloses that there are two coincidence detectors (e.g., 15a, 15b) representing relationship with two different thresholds (e.g., V3 and V2), one of which is for overexposed image and another of which is for an underexposed image as shown in figs. 3 & 4; col. 6, line 58 – col. 7, line 19.

Regarding claim 8, as disclosed by Lu, the decision element reduces (decrements) an exposure time for the overexposed image and increases (increments) the exposure time for the underexposed image (see col. 7, lines 14-19).

Regarding claim 9, Lu discloses that there are at least three threshold levels (e.g., V0 – V4) corresponding to different exposure bands (e.g., BAND0 – BAND4) of the pixels being detected as shown in fig. 4. Further, Lu also identifies BAND3 as an over-exposed band (voltage level is greater V3), and BAND1 as an under-exposed band (voltage level is less than V2) as clearly described in col. 6, lines 48-57. Although Lu does not explicitly disclose that BAND 4 is a seriously over-exposed band and BAND0 is a seriously under-exposed band, those skilled in the art would recognize the obviousness of BAND4 and BAND0 as being the over-exposed band and the under-exposed band, respectively.

Someone skilled in the art would motivate to include at least three the coincidence detectors (corresponding to BAND0 to BAND4) for detecting at least three different features including an over-exposed image, an under-exposed image, seriously under-exposed image and seriously over-exposed image because such wide range of exposure detection would provide a more accurate exposure control technique over image being taken.

Therefore, it would have been obvious to one of ordinary skill in the art to recognize the suggestion of Lu for detecting at least three different features including an over-exposed image, an under-exposed image, seriously under-exposed image and seriously over-exposed image because such wide range of exposure detection would provide a more accurate exposure control technique over image being taken.

Regarding claim 20, the claimed limitations are analyzed with respect to claim 9.

5. Claim 10 & 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al (US 5,504,524) in view of Baumeister (US 4,684,995) and in further view of Yamaguchi (US 5,638,123).

Regarding claim 10, Lu teaches a threshold storing element for storing digital exposure values to control exposure level of an image based on the output from exposure calculator (17) as shown in col. 7, lines 14-19. Lu does not teach the threshold storing element storing first and second increase and decrease thresholds, and overexposed or underexposed image being increased or decreased by the first threshold, and the seriously overexposed or underexposed image being increased or decreased by the second threshold. However, Yamaguchi teaches exposure control utilizing different thresholds for adjusting the shutter speeds of a camera. According to Yamaguchi, each threshold is used for adjusting a suitable shutter speed, such as "very bright" corresponds to "shutter speed up to much degree", "slight bright" corresponds to "shutter speed up" and etc...(see fig. 3). Specifically, there are two stored thresholds of absolute numeric values (i.e., +/- 5 and +/- 1), wherein the "very bright" and "very dark" fall within first increase and decrease threshold of absolute numeric 5, which means the shutter speed is controlled by either adding numeric value 5 to or subtracting 5 from current shutter pulse data; and wherein the "slight bright" and "slight dark" fall within second increase and decrease threshold of absolute numeric 1, which means the shutter speed is controlled by either adding

numeric value 1 to or subtracting 1 from current shutter pulse data (see figs. 2 – 6; col. 7, line 58 – col. 8, line 27).

It would enhance the exposure control process of the camera by enabling the threshold storing element to store the first and second increase and decrease thresholds for controlling the corresponding exposure levels of an image since such technique provides "the exposure time T is shortened by a time five times greater than the shutter pulse period every field" and "making it possible to more finely vary the exposure time" as suggested in col. 11, lines 34-36 & col. 13, lines 30-31.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the invention of Lu with the teaching of Yamaguchi to make the exposure control system more efficiently and to more finely vary the exposure time.

Regarding claim 21, Lu teaches a threshold storing element for storing digital exposure values to control exposure level of an image based on the output from exposure calculator (17) as shown in col. 7, lines 14-19. Lu and Baumeister do not teach that the threshold storing element storing first and second increase and decrease thresholds, and overexposed or underexposed image being increased or decreased by the first threshold, and the seriously overexposed or underexposed image being increased or decreased by the second threshold. However, Yamaguchi teaches exposure control utilizing different thresholds for adjusting the shutter speeds of a camera. According to Yamaguchi, each threshold is used for adjusting a suitable shutter speed, such as "very bright" corresponds to "shutter speed up to much degree", "slight bright" corresponds to "shutter speed up" and etc...(see fig. 3). Specifically, there are

two stored thresholds of absolute numeric values (i.e., +/- 5 and +/- 1), wherein the "very bright" and "very dark" fall within first increase and decrease threshold of absolute numeric 5, which means the shutter speed is controlled by either adding numeric value 5 to or subtracting 5 from current shutter pulse data; and wherein the "slight bright" and "slight dark" fall within second increase and decrease threshold of absolute numeric 1, which means the shutter speed is controlled by either adding numeric value 1 to or subtracting 1 from current shutter pulse data (see figs. 2 – 6; col. 7, line 58 – col. 8, line 27).

It would enhance the exposure control process of the camera by enabling the threshold storing element to store the first and second increase and decrease thresholds for controlling the corresponding exposure levels of an image since such technique provides "the exposure time T is shortened by a time five times greater than the shutter pulse period every field" and "making it possible to more finely vary the exposure time" as suggested in col. 11, lines 34-36 & col. 13, lines 30-31.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the inventions of Lu and Baumeister with the teaching of Yamaguchi to make the exposure control system work more efficiently and to more finely vary the exposure time.

Allowable Subject Matter

6. Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The Prior Arts fail to teach or disclose that the first and second thresholds collectively add up to more than 100%.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (703) 605-4246. The examiner can normally be reached on Monday - Thursday, 8:00am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew B Christensen can be reached on (703) 308-9644. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

NT.

ANDREW CHRISTENSEN
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